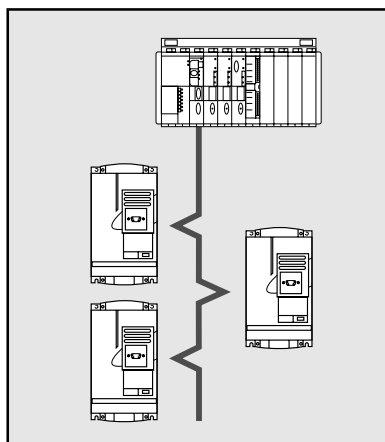


Altivar 58 Telemecanique

Guide d'exploitation
User's manual

Kit connexion RS485
RS485 connection kit

VW3-A58306



GROUPE SCHNEIDER

■ Merlin Gerin ■ Modicon ■ Square D ■ Telemecanique

Kit connexion RS485

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RS485 connection kit

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When the speed controller is powered up, the power components and some of the control components are connected to the line supply. *It is extremely dangerous to touch them. The speed controller cover must be kept closed.*

After switching the ALTIVAR off, *wait for 3 minutes before working on the equipment.* This is the time required for the capacitors to discharge.

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Presentation - Installation

Presentation

The RS485 connection kit includes a 3 m cable equipped with a 9-pin male SUB-D connector and a 15-pin male SUB-D connector.

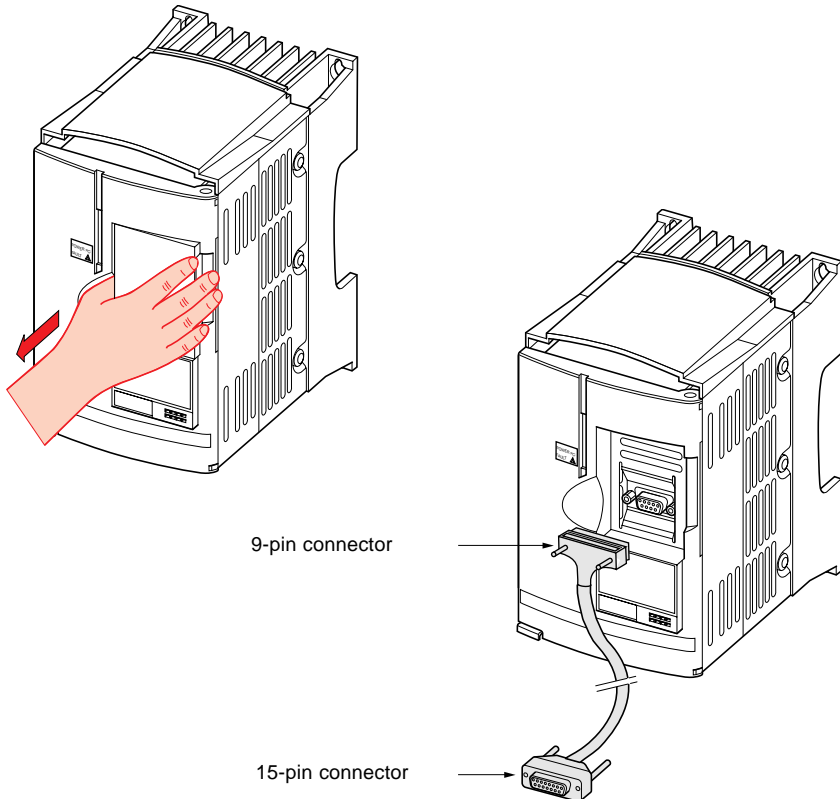
The RS485 multidrop serial link of the Altivar 58 is used for the following functions :

- Configuration
- Adjustment
- Control
- Supervision

The protocol used is Modbus RTU mode. The Altivar 58 parameters with their addresses are listed in the attached document "Internal communication variables".

Installation

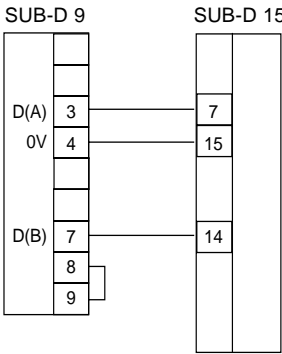
Remove the display module or blanking cover to access the ATV 58 SUB-D connector.
Connect the 9-pin cable connector to the ATV 58 connector.



Connection to Multidrop Bus

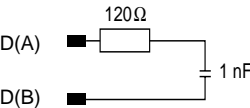
Connection to RS 485 standard bus

Diagram of cable equipped with connectors



Recommendations

- Do not connect anything to pins 1-2-5-6 on the 9-pin connector.
- Use a shielded cable with 2 pairs of twisted conductors.
- Connect the reference potentials to each other.
- Maximum length of line : 1000 metres
- Maximum length of tap-off : 20 metres
- Do not connect more than 18 stations on one bus.
- Cable routing : keep the bus away from the power cables (at least 30 cm) with any crossover at right angles if necessary, and connect the cable shielding to the ground of each device.
- Fit a line terminator at both ends of the line.



Zt line terminator
recommended at
both ends of the line

Note : the link between pins 8 and 9 of the 9-pin connector has no function on the Altivar 58.

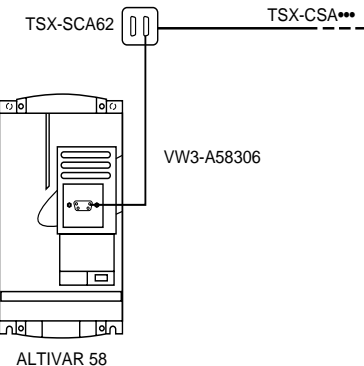
Various accessories are available from the Schneider Automation catalog to aid connection of equipment.

Cables for the **TSX-CSA...** bus are sold in lengths of 100, 200 or 500 m.

TSX-SCA62 subscriber socket

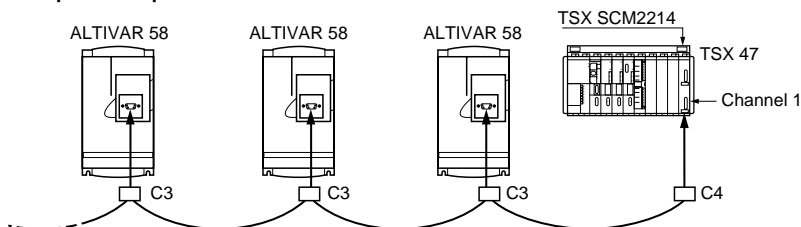
This passive junction box contains a printed circuit equipped with screw terminals and enables two devices to be connected on the bus (2 x 15-pin female SUB-D connectors). It includes a line terminator if the subscriber socket is located at the end of the line.

Example of connection



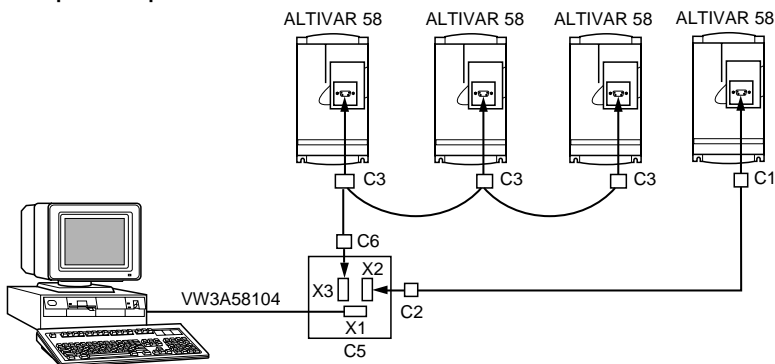
Connection to Multidrop Bus

Example of simplified connection on PLC



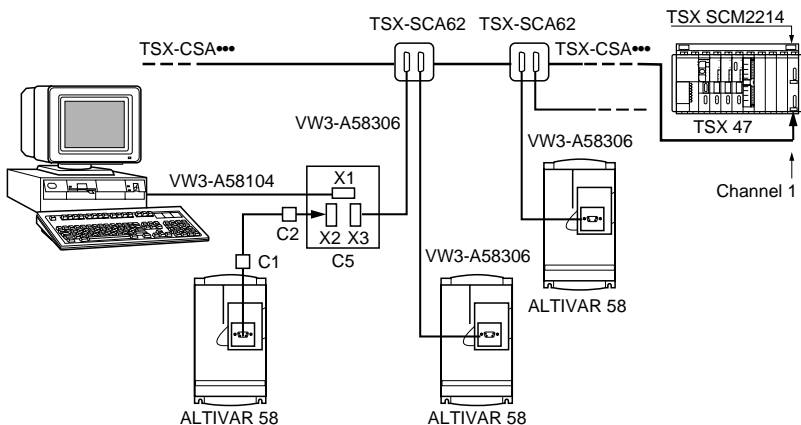
Note : Physical layer with a capacity of 18 drives.

Example of simplified connection of several ATV58H**** or ATV58P**** on PC



Note : Physical layer with a capacity of 18 drives. Don't forget to configure the drive addresses in local mode via the operator's terminal, or programming terminal or PC software respectively connected to each drive.

Example of connection to a RS485 standard bus with PC and PLC



Note : • The PC and PLC cannot be connected simultaneously to the bus.
• Physical layer with a capacity of 18 drives.

Connection to Multidrop Bus

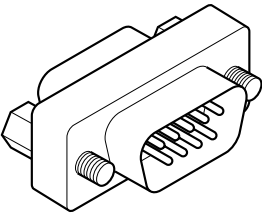
Connection accessories used in the examples

- C1 : 9 -pin male connector ("Phoenix Contact" SUBCON 9/M-SH type) with cabling of the pins 3, 4, 6 and 7 (4 conductor shielded cable, 1 mm² max.), plus male / female adapter 9 -pin SUB-D (1).
- C2 : 9 -pin female connector ("Phoenix Contact" SUBCON 9/F-SH type) with cabling of the pins 3, 4, 6 and 7 (4 conductor shielded cable, 1 mm² max.).
- C3 : Connector "Phoenix Contact " of the SUBCON - PLUS M2 type, plus male / female adapter 9 -pin SUB-D (1). Cabling of the pins 3, 4, and 7 (4 conductor shielded cable, 1 mm² max.).
- C4 : 25 -pin SUB-D male connector with cabling of the pins in correspondence with C3.

C3 pins	C4 pins
3 -----	21
4 -----	not connected
7 -----	23
	1 (shielded on 1)
	15 and 23 connected
	4 and 10 connected
	7 and 8 connected
	11 and 19 connected
	18 and 21 connected

- C5 : Box "Phoenix Contact " PSM - PTK type.
- C6 : Male connector "Phoenix Contact " SUBCON 9/M-SH type with cabling of the pins 3, 4, and 7 (4 conductor shielded cable, 1 mm² max.).

(1) male / female adapter 9 -pin SUB-D :



Exchange format :

The Modbus protocol has the following exchange format :

- Speed 19200 bits / second
- Parity : none
- Format : 8 bits + 1 start bit and 1 stop bit

Modbus frames

RTU mode

The frame defined for the Modbus protocol has neither message header bytes nor end of message bytes. It is defined as follows :



The data is transmitted in binary code.

CRC16 : cyclical redundancy check.

The end of the frame is detected on a silence of ≥ 3 characters.

ATV58 address : the ATV58 address varies from 0 to 31 and is configured in menu 4 "CONTROL" via the PC software or display module.

Modbus Protocol

Principle

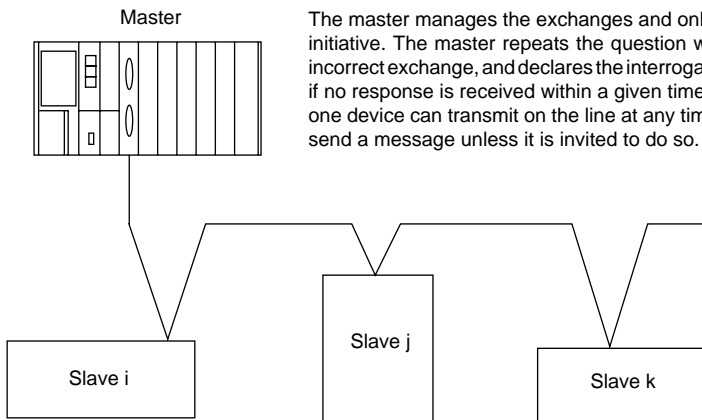
The Modbus protocol is a dialog protocol which creates a hierarchical structure (one master and several slaves).

The Modbus protocol enables the master to interrogate one or more intelligent slaves. A multidrop link connects the master and slaves.

Two types of dialog are possible between master and slaves :

- the master talks to a slave and waits for its response
- the master talks to all slaves without waiting for a response (broadcasting principle)

The slaves are numbered from 1 to 31 and number 0 is reserved for broadcasting.



The master manages the exchanges and only it can take the initiative. The master repeats the question when there is an incorrect exchange, and declares the interrogated slave absent if no response is received within a given time envelope. Only one device can transmit on the line at any time. No slave can send a message unless it is invited to do so.

Note

No lateral communication (i.e. slave to slave) can be performed directly.

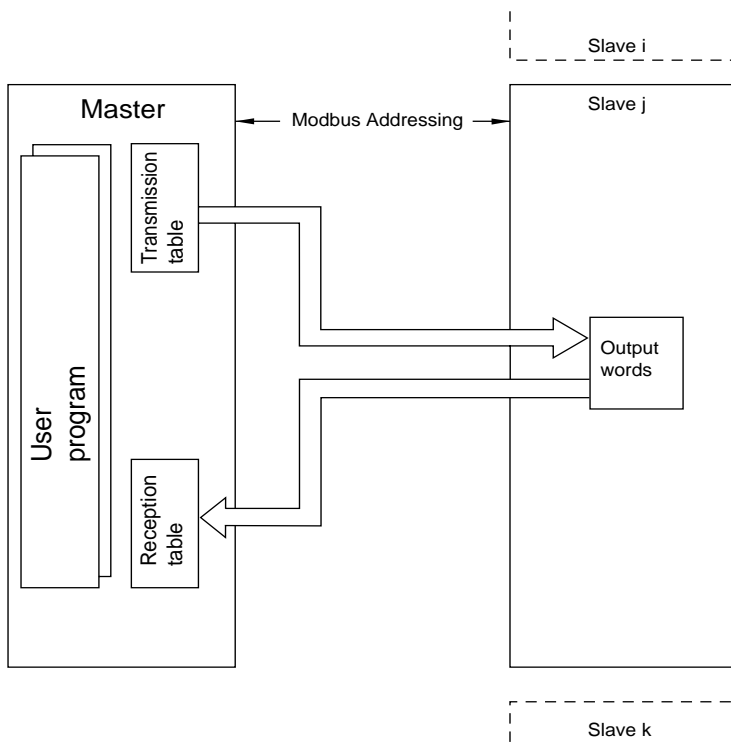
The application software of the master must therefore be designed to interrogate one slave and send back data received to the other slave.

Accessible data

The Modbus protocol enables data (bits and words) to be exchanged between a master and several slaves, and checks these exchanges.

With the ATV 58, only words can be exchanged.

An output object can be read or written. The ATV 58 only contains output objects.



Exchanges

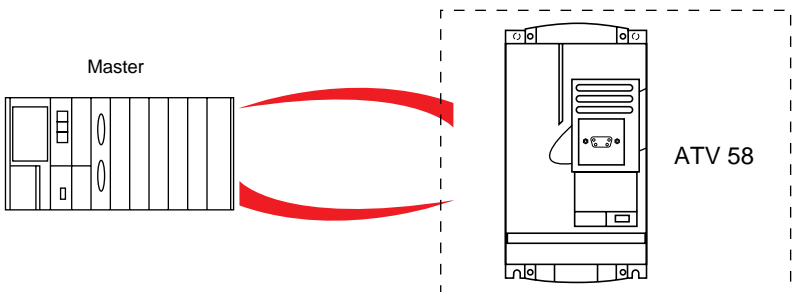
The master, or supervision device, takes the initiative for the exchanges. This master addresses a slave by supplying it with four types of data :

- the slave address
- the function required of the slave
- the data zone (variable depending on the request)
- the exchange check

The link master waits for the response from the slave before transmitting the next message, thus avoiding any conflict on the line. Operation in half-duplex mode is therefore authorized.

Control and supervision

All management of exchanges between two units which are communicating via an asynchronous serial link naturally includes exception responses when exchange faults occur. Various inconsistent messages may be sent to the slave. In this case, the slave will tell the master that it does not understand, and the master will decide whether or not to repeat the exchange.



Modbus functions

The following table shows the functions which are managed by the Altivar 58 communication option, and specifies its limits.

The "read" and "write" functions are defined from the point of view of the master.

Code	Type of function	B (1)	Altivar 58
03	Read N output words		32 max.
06	Write an output word	B	YES
16	Write N output words	B	30 max.

- (1) Functions marked "B" can be broadcast.**
The message transmitted by the master must specify slave number = 0.
A response message is never returned.

Modbus Protocol

Detailed information on functions

- Code 03 : Read N output words
This function is used to read output words (words which can be written and read in the slave by the master).
- Code 06 : Write an output word.
This function is used to write a 16 bit output word (words which can only be written).
- Code 16 : Write N output words
This function is used for the master to read output words in the slave (words which can be written and read).

Details of frames

Read N output words : function 3

Question

Slave no.	03	No. of 1st word	Number of words		CRC16
1 byte	1 byte	2 bytes	Hi	Lo	2 bytes

Response

Slave no.	03	Number of bytes read	Value of 1st word		Value of last word	CRC16
1 byte	1 byte	1 byte	Hi	Lo		Hi	Lo
			2 bytes			2 bytes	2 bytes

Example : read words W450 to W459 of slave 2 (supervision parameters)

Question	02	03	01C2	000A	CRC16
----------	----	----	------	------	-------

Response	02	03	14	xxxx	xxxx	CRC16
				Value of W250		Value of W253	

Write an output word : function 6

Question

Slave no.	06	Word no.	Word value		CRC16
1 byte	1 byte	PF	Pf	PF	Pf
		2 bytes		2 bytes	2 bytes

Response

Slave no.	06	Word no.	Word value		CRC16
1 byte	1 byte	PF	Pf	PF	Pf
		2 bytes		2 bytes	2 bytes

Write N output words : function 16 ('H'10')

Question

Slave no.	10	No. of 1st word	Number of words		Val. of 1st word	CRC16
1 byte	1 byte	Hi	Lo	of words	of bytes	Hi	Lo
		2 bytes		2 bytes	1 byte	2 bytes	

Response

Slave no.	10	No. of 1st word	Number of words		CRC16
1 byte	1 byte	Hi	Lo	Hi	Lo
		2 bytes		2 bytes	

Example : write values 15 and 400 in words W400 and W401 of slave 2

Question	02	10	0190	0002	04	000F	0190	CRC16
----------	----	----	------	------	----	------	------	-------

Response	02	10	0190	0002	CRC16			
----------	----	----	------	------	-------	--	--	--

Exception responses

An exception response is returned by a slave when it is unable to perform the request which is addressed to it.

Format of an exception response :

Slave no.	Response code	Error code	CRC16
1 byte	1 byte	1 byte	2 bytes

Response code : function code of the request + H'80 (the most significant bit is set to 1).

Error code :

- 1 = The function requested is not recognized by the slave.
- 2 = The bit and word numbers (addresses) indicated in the request do not exist in the slave.
- 3 = The bit and word values indicated in the request are not permissible in the slave.
- 4 = The slave has started to execute the request but cannot continue to process it completely.

CRC16 calculation

The CRC16 is calculated on all the bytes of the message by applying the following method.

Initialize the CRC (16-bit register) to H'FFFF.

Enter the first to the last byte of the message :

CRC XOR <byte> → CRC

Enter 8 times

Move the CRC one bit to the right

If the output bit = 1, enter CRC XOR H'A001 → CRC

End enter

End enter

The low order bytes of the CRC obtained will be transmitted first, followed by the high order ones.

XOR = exclusive OR.



0 33 8910 85597 5

VVDED397057

85597

W9 1493690 01 11 A02

1998-02